NOTES ON CHANGES IN SOME OF THE WEATHER ELEMENTS DURING THE SOLAR ECLIPSE OF JANUARY 24, 1925

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In connection with this eclipse, the officials in charge of Weather Bureau stations in and near the path of totality were asked to furnish reports of such meteorological and other observations as could be made without interfering with the regular work of the station. It is unfortunately not possible to publish these interesting reports in full. The following notes summarize the material relating to changes of pressure, temperature, and wind direction and velocity, from such reports as gave these items in sufficient detail to base a graphic representation on them, together with pertinent comments from other reports:

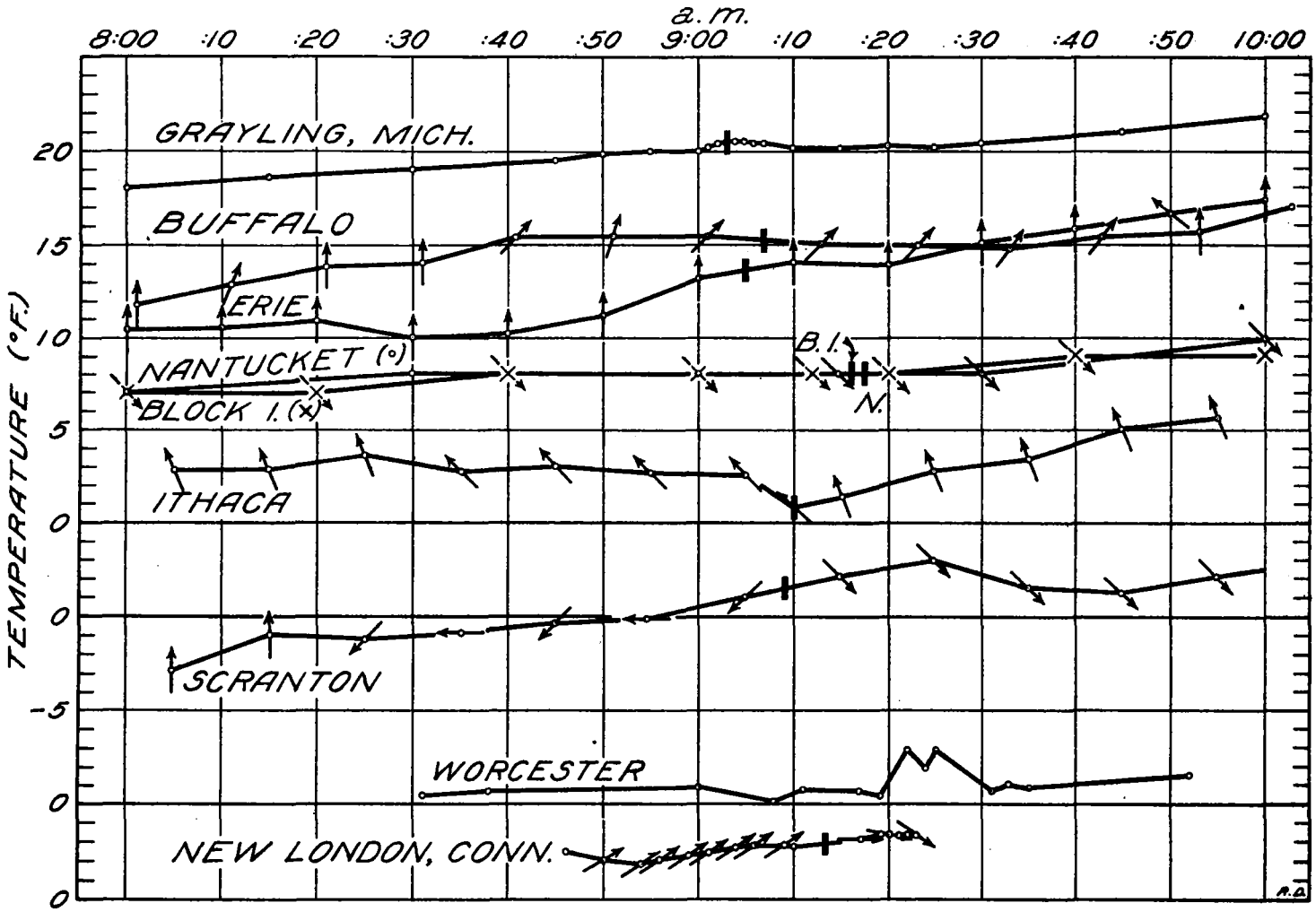

FIG. 1.—Temperature and wind directions at selected stations, during the solar eclipse of January 24, 1925. (Arrows fly with the wind. Heavy vertical bars show approximate time of middle of totality)

Pressure.—Only two stations noted changes in atmospheric pressure during the eclipse, which were of any apparent significance. Springfield, Ill., reported a moderate steady fall of pressure as being checked from 7 a. m. to about 9 a. m. Buffalo reported pressure declining until 15 minutes before totality, a rise of 0.02 inch at totality, followed after totality by a resumption of the fall. All other stations reported to the effect that there seemed to be no measurable influence on pressure as a result of the eclipse.

Temperature.—Nine reports included temperature readings beginning sometime before 8 a. m. and ending usually sometime after 10 a. m. Figure 1 represents these observations in graphic form (together with wind directions), on a vertical scale suitable for showing tenths of a degree F. change.

It will be noted that most of the observed changes at or near totality are of less than 1° F. in magnitude. Some of them are rather to be described as temporary cessations in a general forenoon rise. At some stations a decrease in the rate of rise took place well in advance of totality. It is impossible, however, to say how much, if any, of this change was due to the advance of the eclipse, and how much to cloudiness. Thus at Grayling, Mich., the sky was uniformly covered by a sheet of A. St. during the whole period. At Buffalo the sky was 0.9 obscured by 7:30 a. m., though the sun shone through an opening in the southeast until 8 a. m., after which it never appeared again until totality, during which at three times it appeared through rifts in the clouds. At Ithaca, the maximum observed temperature during the period occurred at 8:25, the sun having become partially obscured by A. St., which, however, had largely become dissipated by the time totality occurred. The temperature slowly fell as the clearing proceeded. How much of this fall one may ascribe to the progress of the eclipse and how

much to an increase of radiation from the earth's surface induced by the clearing is impossible to say. About the drop of 1.6° at totality, on the other hand, there can be little doubt. It was one of the two largest of those reported, and was accompanied by a very noticeable increase in wind velocity as attested by several observers (from a measured velocity of 16 m. p. h. just before totality to an estimated velocity of 20 m. p. h. shortly after). Of the temperature changes at New Haven there can be little doubt that they were due directly to the eclipse. "At 8 a. m. the sun was shining through thin clouds and in a few minutes they had so scattered as not to interfere with perfect vision during the time of the eclipse." "The sunshine recorder stopped registering at 8:35 a. m., and did not begin registering again until 9:45 a. m." At 8 a. m. the temperature was 3° F., at 9 a. m. 4° F., but had fallen 2° by 9:30, when it began a rapid rise. This drop of 2° was the largest reported.

At two stations a considerable rise of temperature was underway at the time of the eclipse, and at both stations occurred very slight and temporary hesitations in the rise which may or may not have been due to the eclipse. Thus Erie showed a fall of 0.8° between 8:20 and 8:30 (early part of the onset of the moon's disk) and a cessation of the rise from 9:10 to 9:20 (*after* totality), these changes being coincident with a continuous south wind of 27 to 35 m. p. h. Scranton, Pa., notes a cessation of a rise at 8:15, its very gradual resumption in the shape of a rise of 0.9° by 8:55 a. m. and thereafter a rise for which no decrease of rate was observed throughout the period of totality nor until 9:25. A fall of temperature of 2° was observed between 9:25 and 9:45.

Wind directions and velocities.—Changes in these respects were of considerable magnitude. Nevertheless, as will be seen from the following notes, very few of the reports indicated the occurrence of what could unmistakably be called eclipse winds. It is difficult to distinguish between coincidence and real relation where there is so much opportunity for both. In two or three cases, however, the evidence seems strongly in favor of eclipse winds having occurred.

Grayling, Mich.: 8 a. m., moderate S. wind, overcast sky. During totality, a snow flurry of about three minutes' duration, when it seemed "very windy." 9:07, "fresh wind"; 9:10, "wind continues"; 9:20, "wind less"; 10, "wind much lighter."

Buffalo, N. Y.: A 23 m. p. h. average velocity "up to the time of the eclipse," decreased to 12 m. p. h. at five minutes after totality, and increased thereafter to an average of 18 m. p. h. *Wind veered* from S. at 8:30 to SW. and SSW. during the eclipse until 9:53, when S. wind was again recorded.

Ithaca, N. Y.: Wind SE. from about 7:30 to about 8 a. m., SSE. from about 8 to about 8:30, SE. thereafter until about 9:15, when it *veered* to SSE., remaining in that direction until near the end of the eclipse, when it again backed into SE. Increase in velocity occurred at totality, as noted above, but no gusts except the first sudden increase.

Erie, Pa.: Wind S. throughout the period. Velocity declining from 36 m. p. h. at 8:50 a. m., at ten-minute intervals showing successively 34, 30, and 28 m. p. h., to 9:20, rising thereafter.

Scranton, Pa.: To 8:15 a. m., S.; 8:25–9.05, varying between E. and NE., with NE. at 9:05; 9:15, onward, NW. Velocity 3 m. p. h. to and including the 9:15 observation, 4 m. p. h. during the NW. wind thereafter.

New Haven, Conn.: 8–9 a. m., "quite steady from NW"; 9–10 a. m., variable, but *backing* into SW.

New London, Conn.: "The pronounced shift of wind direction from southwesterly to northwesterly with the passage of the shadow is highly suggestive of the eclipse cyclone superimposed on a general west wind of moderate strength." (C. F. Brooks.)

Nantucket, Mass.: Direction NW. throughout period. Velocity from 14 m. p. h. at 8:30 a. m. to 10 m. p. h. at 9:15; up to 13 m. p. h. at 9:30; down to 10 m. p. h. at 10 a. m.

Block Island, R. I.: Direction NW. throughout period. Velocities varying between 12 and 14 m. p. h., with a drop from 12 to 10 between 8:40 a. m. and 9 a. m., returning to 12 m. p. h. at 9:40.

OBSERVATIONS ON THE SOLAR ECLIPSE OF JANUARY 24, 1925, AT WASHINGTON, D. C.

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At the American University, in a suburb of Washington, D. C., photometric measurements of the intensity of the illumination on a horizontal surface, from the sky alone, and from the sun and sky combined, were made at intervals from 8 a. m. until noon, 75th meridian time.

The atmospheric conditions were not ideal, as is shown by the following notes made by Mr. Hand and myself:

7:30 a. m.: A few clouds on SE. horizon. Low dense smoke, above which the tops of the Arlington towers were visible.

7:50 a. m.: Few clouds on NW. horizon. Sky overhead streaked with smoke. Sun emerging from dense smoke cloud over city.

8:00 a. m.: Smoke rising; Arlington radio towers and clouds on horizon obscured. Distinct odor of coal gas.

9:35 a. m.: Wind driving smoke away. Arlington towers again visible.

12 noon: Smoke still present, but quantity greatly diminished.

The intensity of daylight illumination on a horizontal surface at 8 a. m. was 352 foot-candles; at 9:08 a. m., 89 foot-candles; at noon, 5,000 foot-candles. Compared with average values on clear days at this time of the year the noon value on the 24th is only slightly deficient, while the 9:08 a. m. value (maximum obscuration at 9:04 a. m.) is only about 4 per cent of the average.

Continuous records of the intensity of the total, or heat radiation, received at normal incidence from the sun, and on a horizontal surface from the sun and sky combined, were obtained during the eclipse. At normal incidence the intensity was about 0.02 gram-calories per minute per square centimeter, and on a horizontal surface about 0.01 gram-calorie, or 3 and 3.5 per cent, respectively, of the intensities that would have occurred had there been no eclipse. These latter values have been obtained by interpolation between measurements made just before first contact and after fourth contact in the case of the intensity at normal incidence, and by comparison with the thermoelectric pyrheliometer record for the following day in the case of the intensity on a horizontal surface. In appearance, the sky on the morning of the 25th was of about the same character as on the 24th.

The combined evidence of the measurements of solar radiation intensities by both photometric and pyrheliometric methods is to the effect that if the moon eclipsed 95 per cent of the sun's disk at the time of maximum